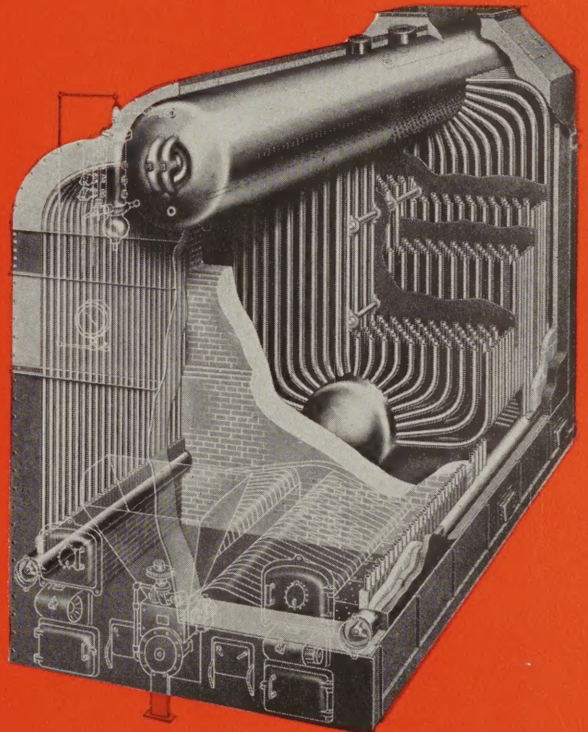
ESTABLISHED 1864

1948

KEELER *type* "CP"
STEAM GENERATOR



The Seal of Quality

E. KEELER CO.
WILLIAMSPORT, PA.

Bulletin F 12

FOREWORD

The selection of a steam boiler or generator is a problem that deserves the most careful consideration, if satisfactory and economical service over a long period of years is to be expected. In an effort to assist the prospective purchaser in making a wise selection, a few simple suggestions are here offered:

1. Be sure that the boiler selected is of the proper type and size to take care of your present needs, with sufficient reserve capacity to allow for the growth of your business;
2. That the stack or chimney to be used will furnish adequate draft for the capacity expected now and in the future;
3. That the combustion equipment to be installed in the furnace is suitable for the fuel available in your locality;
4. That economy of fuel consumption, low cost of maintenance and repairs can be expected to offset, in a short period of time, any difference in first cost, compared with other types of equipment offered by other manufacturers;
5. That the manufacturer can furnish a list of representative satisfied users of similar equipment;
6. That the manufacturer from whom you propose to buy is an old, well established concern, experienced in boiler building over a long period of years, and financially responsible.

The purchase of a CP boiler from the E. Keeler Co. assures the owner that all of the foregoing conditions will be satisfied.

~

E. KEELER CO.,
BUILDERS OF BETTER BOILERS SINCE 1864
WILLIAMSPORT, PA.
Representatives in Principal Cities

INTRODUCTION

The Keeler Type CP Steam Generator has been designed to meet the demand for a modern boiler at moderate cost embodying the following desirable features:

1. It is completely steel encased and insulated.
2. No brick work required except for the front wall and bridge wall.
3. The sides of the furnace are water cooled.
4. Clinkers cannot adhere to sides of the furnace.
5. Furnace maintenance costs are reduced to a minimum.
6. Provides more capacity in a given space than any other type.
7. Can be operated at high overloads without disturbing the water level.
8. Easy to clean interior or exterior. Has built-in mechanical soot blower.
9. Made in a large range of sizes in pressures up to 500 pounds.
10. Units as large as 250 H. P. can be shipped completely assembled.
11. Has larger combustion chamber with less head room than any other type.
12. High efficiency with any method of firing.
13. Capacities to 100,000# of steam per hour.

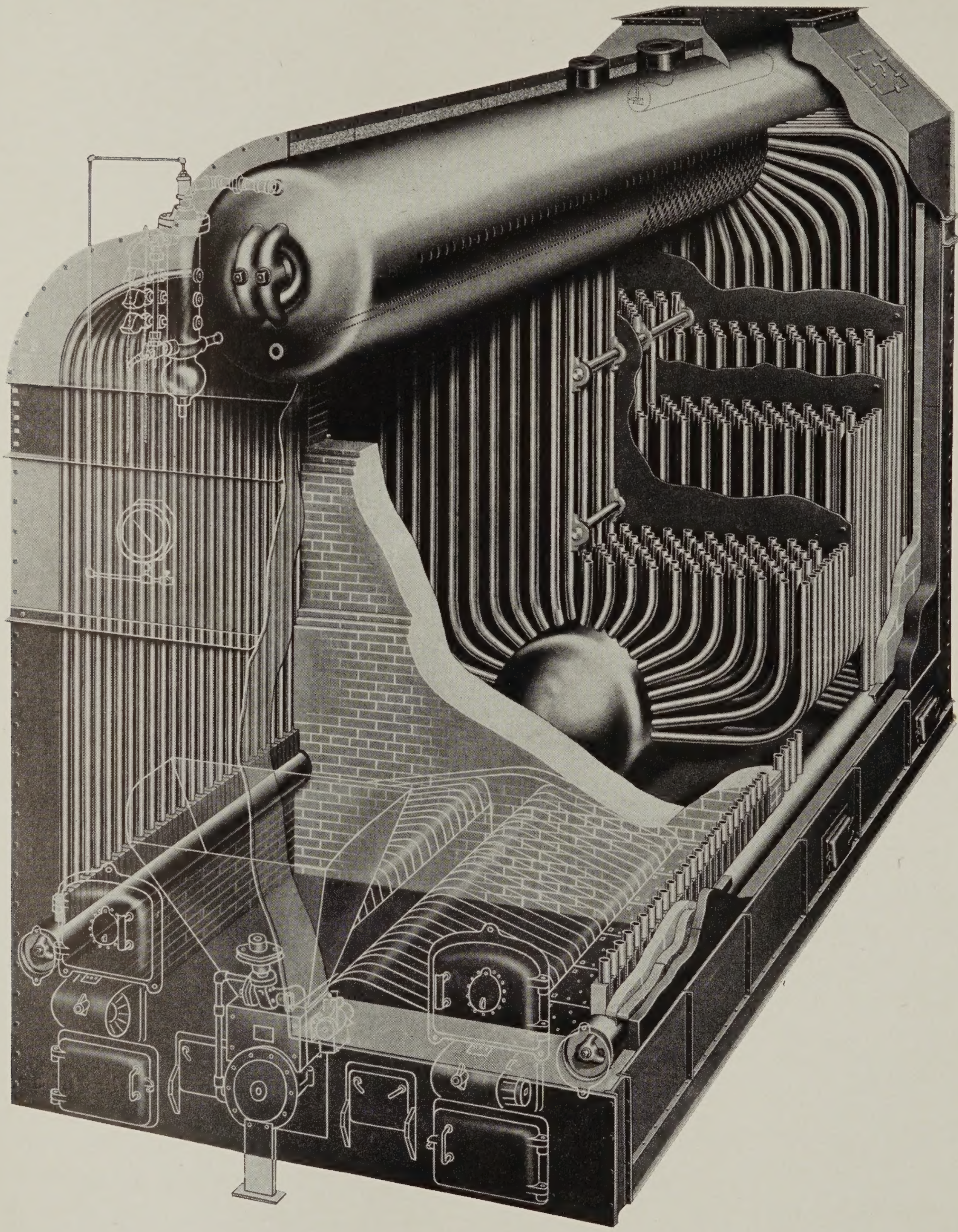
The illustrations and printed matter on the following pages set forth in more detail the advantages listed above.

Drum Construction

Either riveted or fusion welded drums built to A. S. M. E. standards can be furnished.

The Keeler shops are equipped with the latest improved type of X-ray equipment for examining the welds, and a large modern annealing furnace for stress relieving the drums after the seams have been welded.

All Keeler Boilers Are Built to A. S. M. E. Standards



The picture shown above is a reproduction of an artist's drawing of a 500 H. P. CP Steam Generator fired by a single retort underfeed stoker. The design is patented in the United States (Patent No. 2,097,268) and in Canada (Patent No. 372,802).

See Page 27 for Principal Dimensions

GENERAL DESCRIPTION

The Keeler Type CP Steam Generator is a boiler of the water tube type. The pressure unit consists of an upper water and steam drum which extends the full length of the steel cased insulated setting; a lower water drum of the same diameter, approximately half as long as the upper drum; rows of bent tubes which connect the upper and lower drums; two water wall headers, one on each side of the boiler, extending the full length of the setting, connected at their rear ends to the lower water drum by means of short circulating tubes, and to the upper drum by means of side water wall tubes.

Circulation

The feed water enters the boiler through an opening, in the front head of the upper drum, to which an internal feed pipe is attached. This pipe discharges the water at the rear end of the upper drum; from here the water flows down the rear bank of tubes into the rear end of the lower drum, then horizontally through the short circulating tubes into the water wall headers, forwardly and up through the side water wall tubes into the upper drum, making a complete cycle of circulation. A second cycle of circulation occurs in the main bank of boiler tubes, flowing downwardly from rear end of upper drum to rear end of lower drum, at the rear of the tube nest, and upwardly from the forward end of the lower drum into the upper drum directly above. This circulation occurs in a free and natural manner without the use of internal baffle plates, which are necessary in other designs, and makes it possible to operate at high overloads with exceptionally dry steam and with no disturbance of the water level, which is normally at the center of the upper drum.

Setting

The entire setting is steel encased and insulated, 2″ refractory tile being used adjacent to the water wall tubes, with 2″ block insulation on the outside of the tile at furnace zone and 3″ of mineral wool backing up the blocks. From the rear of the bridge wall 5″ of mineral wool is applied to the 2″ refractory tile. The rear wall consists of 3″ of mineral wool between an inner and an outer steel casing. This type of setting prevents loss of heat by radiation and keeps air from leaking in. The upper half of the upper drum is insulated with 2″ of rock wool and covered with a steel jacket.

Baffles

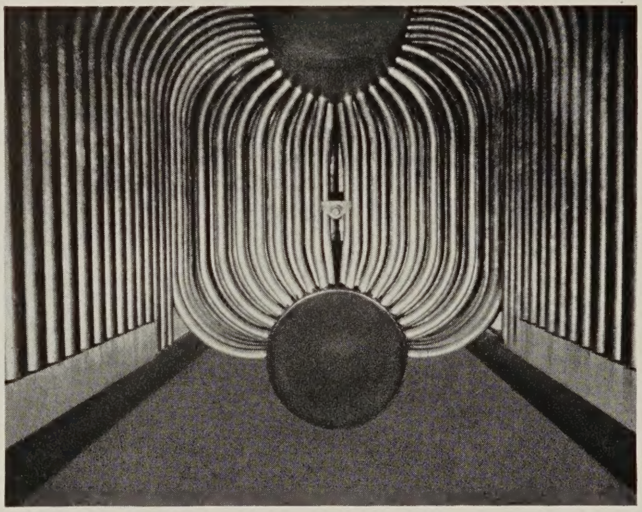
The baffles which direct the flow of the gases through the main tube bank are made of metal and are clamped to the tubes by means of U bolts. This keeps them from becoming overheated. They are arranged so as to obtain a four pass gas flow from furnace to gas outlet. Being vertical, soot and fly ash cannot accumulate on them, and they are easier and less expensive to replace than refractory or monolithic baffles, such as are used in other types of water tube boilers.

Water Walls

Until the invention of the Keeler CP Steam Generator in the year 1935, furnace water walls were uncommon except in large high pressure boilers used by Public Utility Stations and the larger industrial plants. With the advent of the Keeler CP Steam Generator the advantages of water walled furnaces have been made available to the average boiler user, both large and small.

The advantages of a water cooled furnace are several. By the installation of water tubes along the sides of the furnace, additional heat absorbing surface is obtained without increasing the space occupied by the boiler. This heating surface is very effective, as it is exposed to the radiant heat of the fire, which is the best heat; and it will absorb more BTU's per sq. ft. than heating surface in the main tubes of the boiler which absorb heat by convection.

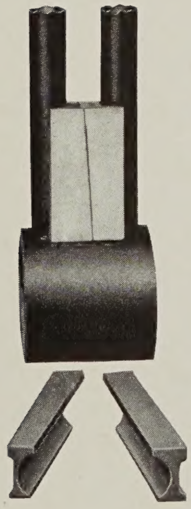
With a water cooled furnace a higher percentage of CO_2 can be maintained, resulting in a higher furnace temperature than can be safely carried in a refractory lined furnace, resulting in higher boiler efficiency and eliminating the necessity for frequent furnace repairs.



Looking in the Furnace

The picture shown above is a view of the interior of the furnace of a CP boiler with the bridge wall removed. The furnace water wall tubes and the headers into which they are expanded appear at each side of the furnace. The end of the soot blower element appears at the center of the tube next.

The bridge wall may be either refractory wall or a water cooled wall as shown in pictures appearing on other pages of this bulletin.



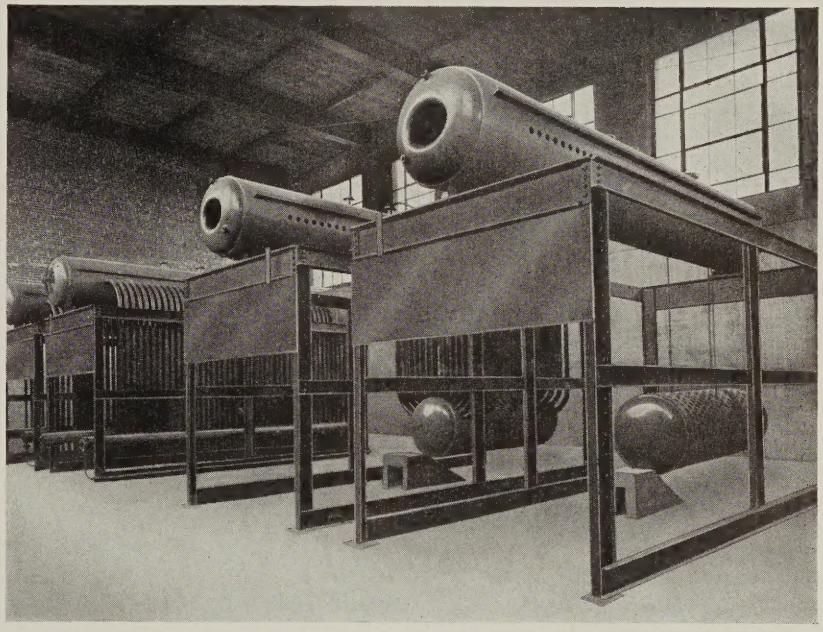
Armor Blocks

Water Wall Armor

Water wall armor is shown on the bottom ends of the water tubes adjacent to the water wall headers. This armor protects the water wall tubes from the abrasive action of the fuel and prevents clinker formation along the edge of the fuel bed.

The picture at the left shows two water wall tubes with the wedge shaped armor blocks between them. These armor blocks are curved and smooth to accurately fit the tubes, and being wedge shaped they make good contact with the surface of the tube when shoved into position, insuring long life for the armor. They can be renewed from the furnace side of the tubes when necessary. (See page 19 for additional pictures of water walled furnaces).

Method of Support



Showing Method of Support

A well designed boiler must be free to expand and contract in such a way that undue strains and stresses will not be exerted on any part of the boiler proper, or on the main steam piping which is connected to it. This can best be accomplished by suspending the boiler from overhead girders which are supported by columns resting on concrete piers at the four corners of the setting. This method is used for the support of the CP boiler. The upper drum rests at each end upon a cast iron cradle bolted to the horizontal girder. The lower drum is suspended from the upper drum by the connecting tubes. The front and rear supporting frames are connected by longitudinal channels to which the steel casing is bolted. A vertical I beam buckstay midway between front and rear columns serves to keep the horizontal connecting channels from spreading. When a guyed steel stack is used it can be mounted directly over the boiler gas outlet at the rear top of the setting on a structural steel supporting frame built as an integral part of the boiler supporting frame work. When an induced draft fan and Venturi type stack are used this equipment can all be mounted in a similar manner.

Space Requirement

With the CP steam generator, more capacity can be installed per cubic foot of space occupied than with any other type of water tube boiler. Greater furnace volume with less head room can also be obtained. This minimizes the cost of housing which should be considered when comparing prices with ordinary boilers.

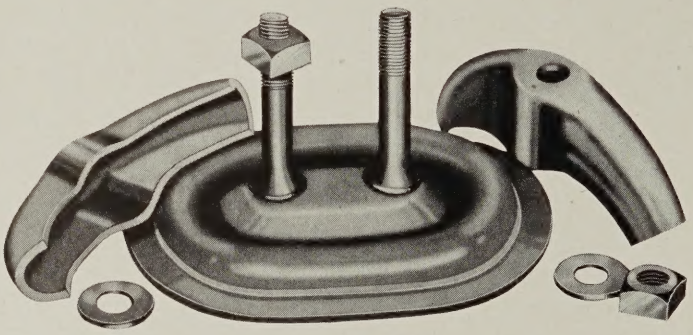
Tube Replacement

No more head room is required for the replacement of a tube in a CP boiler than is required for the steam piping. As the baffles are vertical they do not interfere with and are not damaged by the replacement of a tube. No more time or skill are required for this operation than for any other type of bent tube or straight tube boiler.

Cleaning

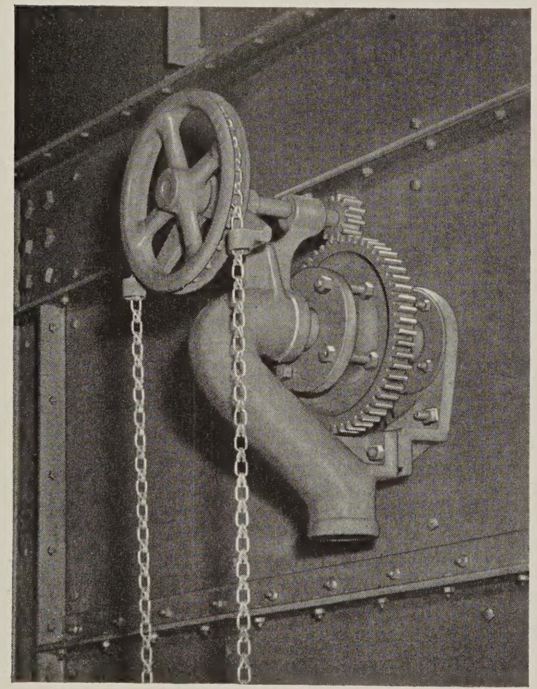
The type CP boiler is an easy boiler to clean. A manhole is provided in the front head of the upper drum and in the rear head of the lower drum for access to interior of drums. Heavy pressed steel manhole plates with integral bolts and twin pressed steel yokes are provided for closing manhole openings.

A blow off connection is provided on the underside of the lower drum as well as at the front end of each water wall header. A handhole opening with heavy pressed steel plate and yoke is provided at the front end of each water wall header for access to interior of header when washing down. Openings are provided on the bottom of each water wall header for access to the ends of tubes expanded into the top of the header. These openings are closed by Key handhole caps which are inserted in tapered holes, metal to metal, eliminating the use of gaskets.



Pressed Steel Manhole Cover

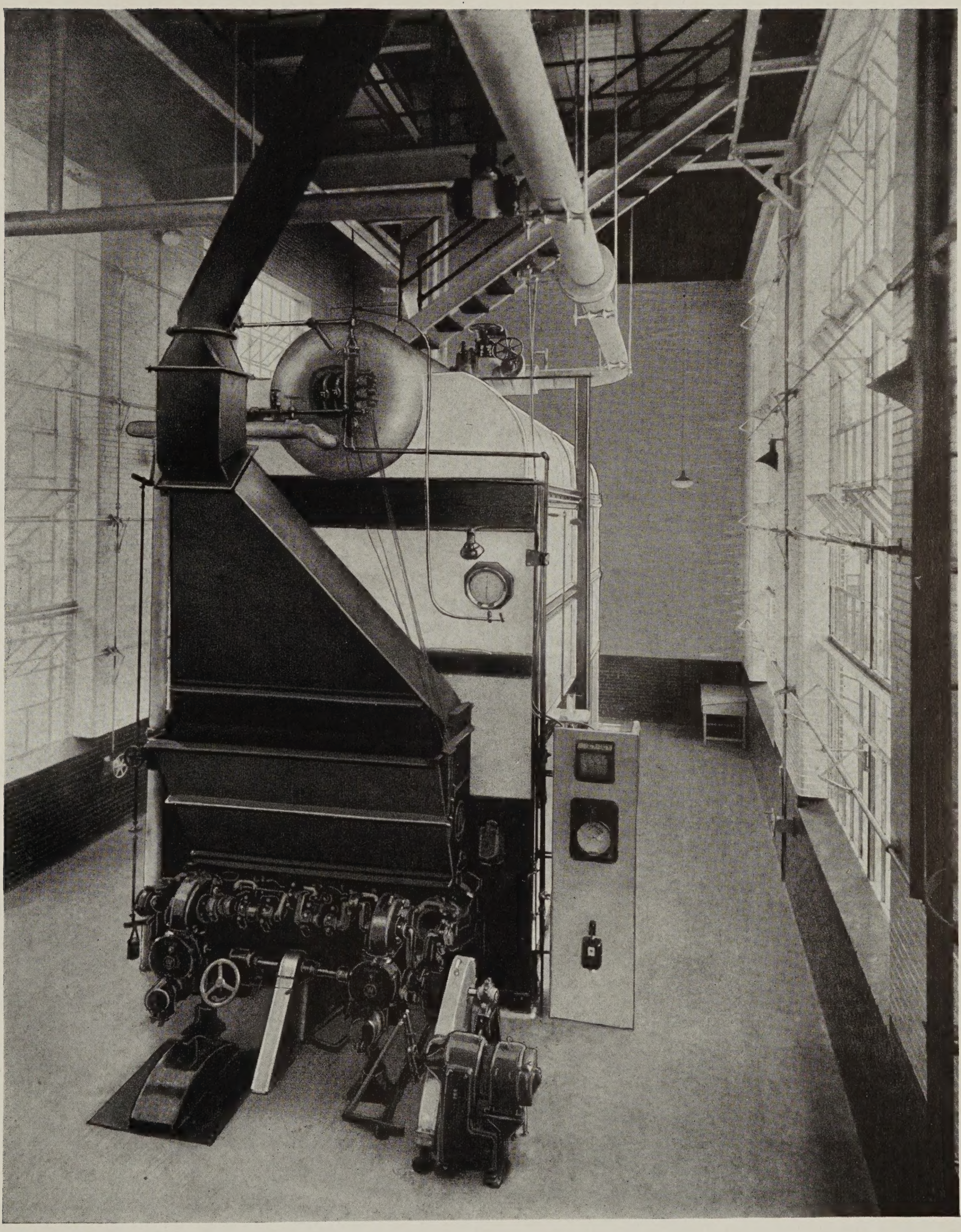
When the boiler tubes require turbining it is only necessary to enter the upper drum, from which all of the main boiler tubes and water wall tubes can be reached, and as all the tubes are the same diameter only one turbine cleaner tool is necessary. It is not necessary to remove the Key caps on the bottom of the water wall headers when the boiler is being turbined. The only time these caps must be removed is when it becomes necessary to remove a water wall tube. The caps can be reused.



Keeler Soot Blower Head

Soot Removal

Because of the unique design of the CP boiler the problem of soot removal is less difficult than with any other type. One high temperature rotating steam soot blower element, operated at the rear of the boiler, is all that is necessary on all except the larger sizes, where not more than two are required. Soot blowers are included as standard equipment. The blower element can be renewed, if ever necessary, through the fire box, if space is not available at the rear of the boiler. The element is protected by the bridge wall from direct furnace heat, thus insuring longer life than in other types of water tube boilers.

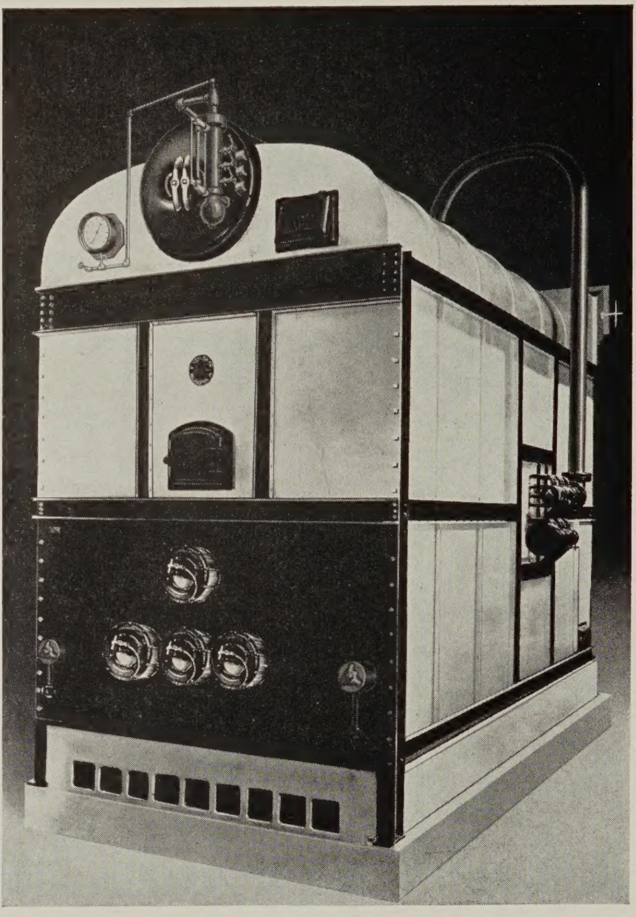


Type CP Steam Generator With Multiple Retort Rear Dump Stoker
35,000 lbs. of Steam Per Hour

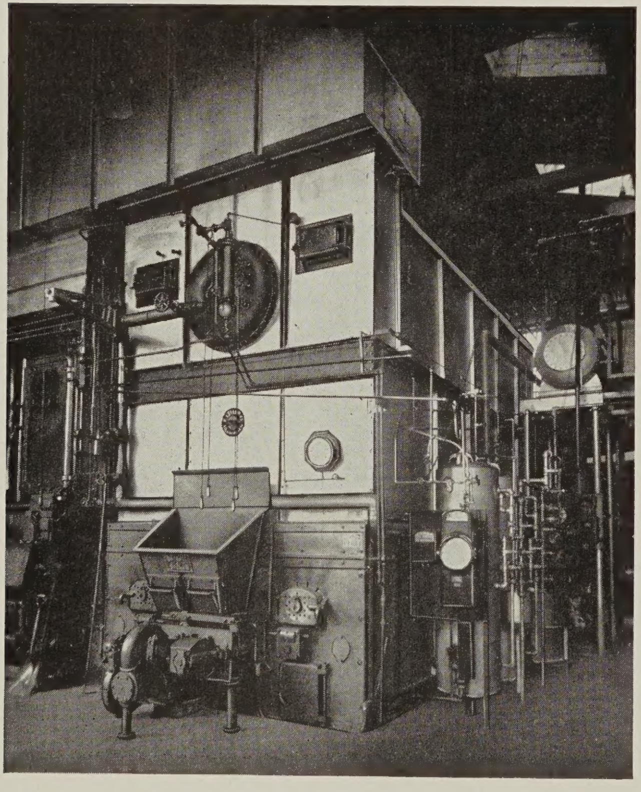
Fuel Adaptability

The design of the CP steam generator is such that the furnace can be readily adapted to any type of fuel burning equipment. Installations have been made for burning bituminous coal, anthracite coal, oil, natural gas, wood refuse from saw mills, and for the utilization of waste heat from smelters and incinerators. Underfeed stokers, traveling grates, spreader type stokers, pulverizers and all types of oil burners are being used successfully under CP steam generators. On following pages will be found illustrations showing various types of settings for the different fuels and fuel burning equipment.

Trimmings, such as water column, steam gauge, safety valves, feed and blow off valves, are all of the best grade obtainable.



Oil Fired Unit With Super Heater

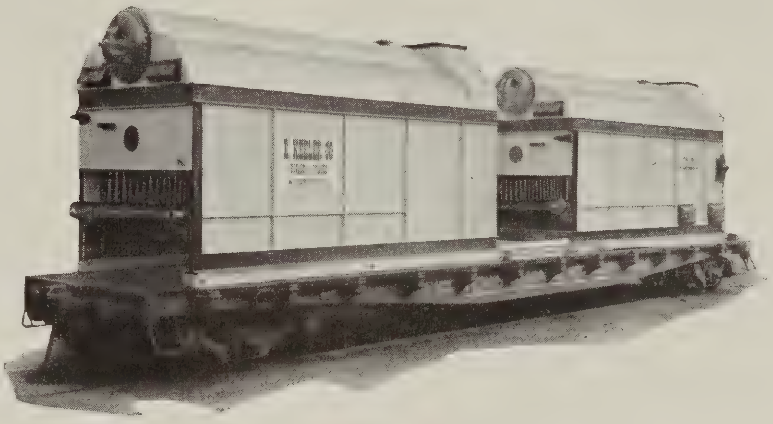


Gas Outlet at Front

The gas outlet on a CP steam generator is usually at the top at the rear of the setting. It can be a vertical or horizontal outlet to suit local conditions. The baffles can be arranged so that the gas outlet can be at the bottom of the rear wall of the setting if such an arrangement is necessary. In some cases it may be preferable to have the gas outlet at the top front end. Such an arrangement is shown in the picture at the left and is accomplished by simply extending the side casing and the top covering high enough to form a duct for the gases to travel forward from the rear of the setting.

Shipping Assembled

On account of the compact nature of the CP design, units capable of delivering as much as 16,000 lbs., of steam per hour continuously can be shipped completely assembled, making it possible to have the boiler ready for service in a much shorter time than when shipped knocked down, and reducing the number of man hours required for installation to a minimum.

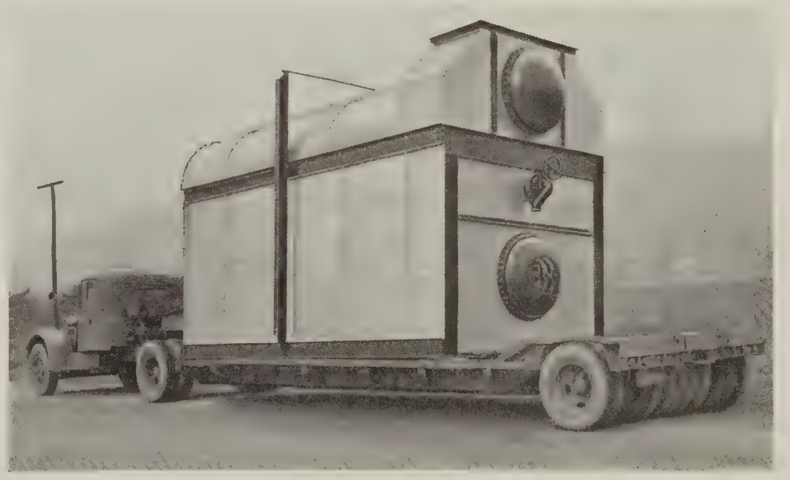


Two Boilers on Flat Car

Three Boilers and Breeching

The E. Keeler Co. operates a well equipped sheet metal shop and is prepared to furnish guyed steel stacks, breechings, hoppers, and other fabricated sheet metal items. A crew of experienced erecting engineers is maintained for the erection of its products. The boilers shown in the picture at the left are installed in a Metropolitan Housing project.

The view at the right shows a CP boiler being delivered by truck and trailer. Mounted on the rear end of the boiler, between the upper and lower drum, appears the soot blower head. The pictures shown on this page clearly illustrate the rugged frame work from which the boiler is suspended.



Hauling by Truck and Trailer

Tube Spacing

In most bent tube boilers the tubes are spaced in parallel rows with respect to the gas flow, with alternate wide and narrow spacing so a tube can be replaced if ever necessary. In the diagram below, Fig. 1, the arrows indicate the gas flow, the gases being free to flow past the tubes, touching only the adjacent surface. Now look at Fig. 2. In this diagram the tubes are staggered with respect to the gas flow, the gases being compelled to completely surround the tube as they travel from furnace to gas outlet. Wide and narrow spacing is at right angles to the gas flow. This tube spacing is used in all CP steam generators and assures maximum heat transfer.

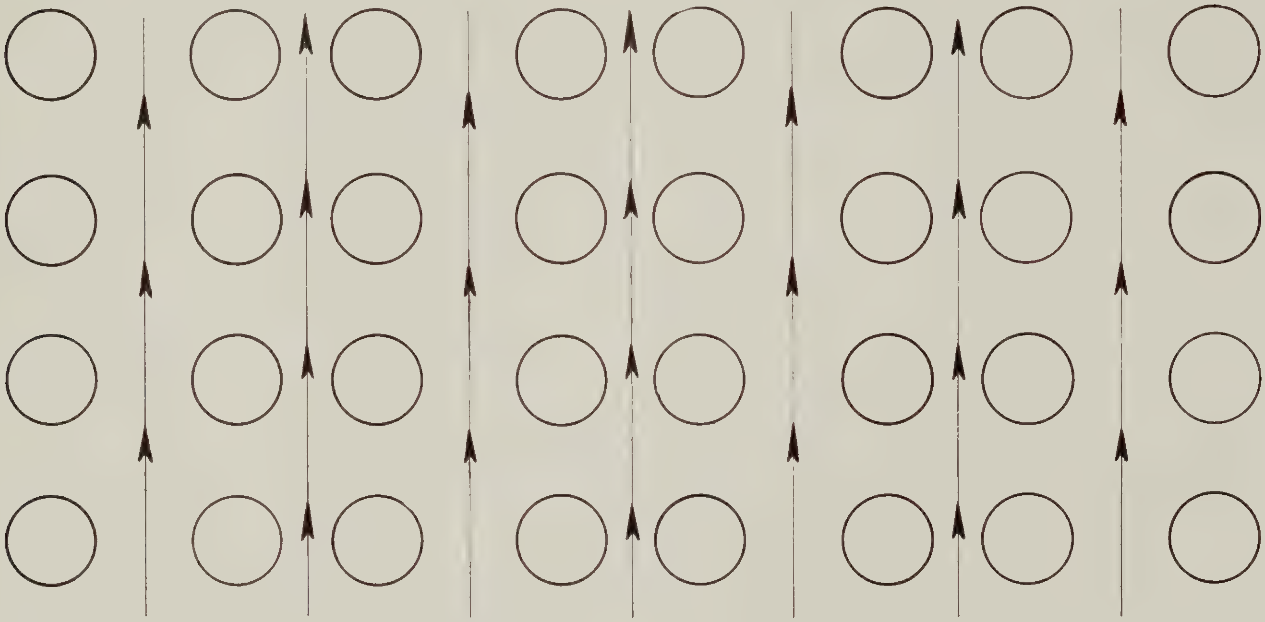


Fig. No. 1

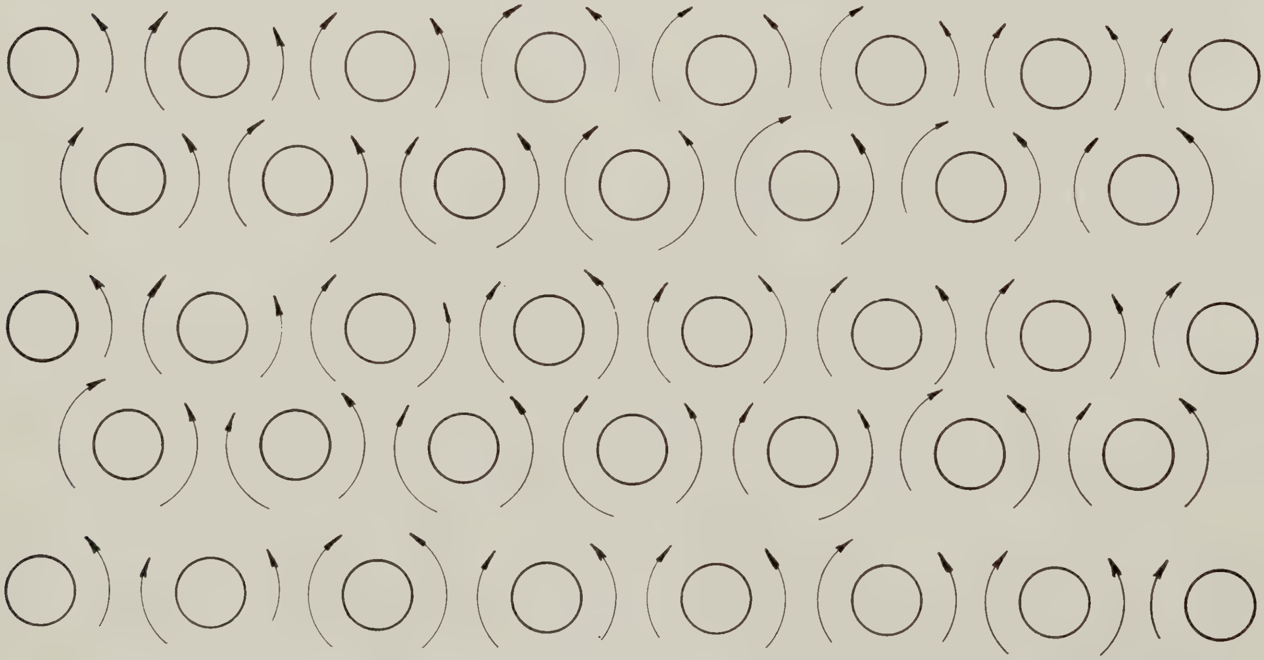


Fig. No. 2

Tests of Keeler Type CP Steam Generators

LOCATION	Edgar F. Hurff Swedesboro, N.J.	Valley Industries Inc., Sayre, Pa.	Mich. Tanning & Extract Co. Boyne City, Mich.	Eberle Tanning Company Westfield, Pa.	Elite Laundry Washington, D.C.
ENGINEER	Harry E. Corl Philadelphia	Lockwood Green Engineers, Inc.	Detroit Stoker Co., Detroit	E. M. Gilbert & Co., Reading, Pa.	Julius G. Berger Newark, N. J.
Rated Boiler H. P.	250	225	300	300	350
Fuel Used	Cent. Pa. Bit. ¾″ Slack	W. Pa. Bit. ¾″ Slack	Mich. Bit.	NaturalGas	Fuel Oil
Fuel Burning Equipment	Single Retort Underfeed Stoker	Single Retort Underfeed Stoker	Spreader Type Stoker	Gas Burner	Steam Atomization Oil Burner
Flue Gas Analysis CO_2	14.2	10.9	13.53	10.98	12.5
Steam Pressure by Gauge	115.7	111.3	115	117.5	138.6
Draft Loss Through Boiler	0.299	0.244	0.350	0.28	0.167
Moisture in Steam	0.345	0.56	0.50	0.82	0.343
Exit Gas Temperature	535	506	473	436	463
Average H. P. Developed	508	347	459	502	496
Percentage of Builder's Rated Capacity	203	154	153	167	141.8
Average Evaporation F & A 212° F. Per Lb. Coal as Fired	11.89	10.49		0.8433 per cu. ft. gas	
Average Overall Efficiency	82.63	80.0	79.39	80.2	82.93

The results indicated above were obtained without economizers or air preheaters.

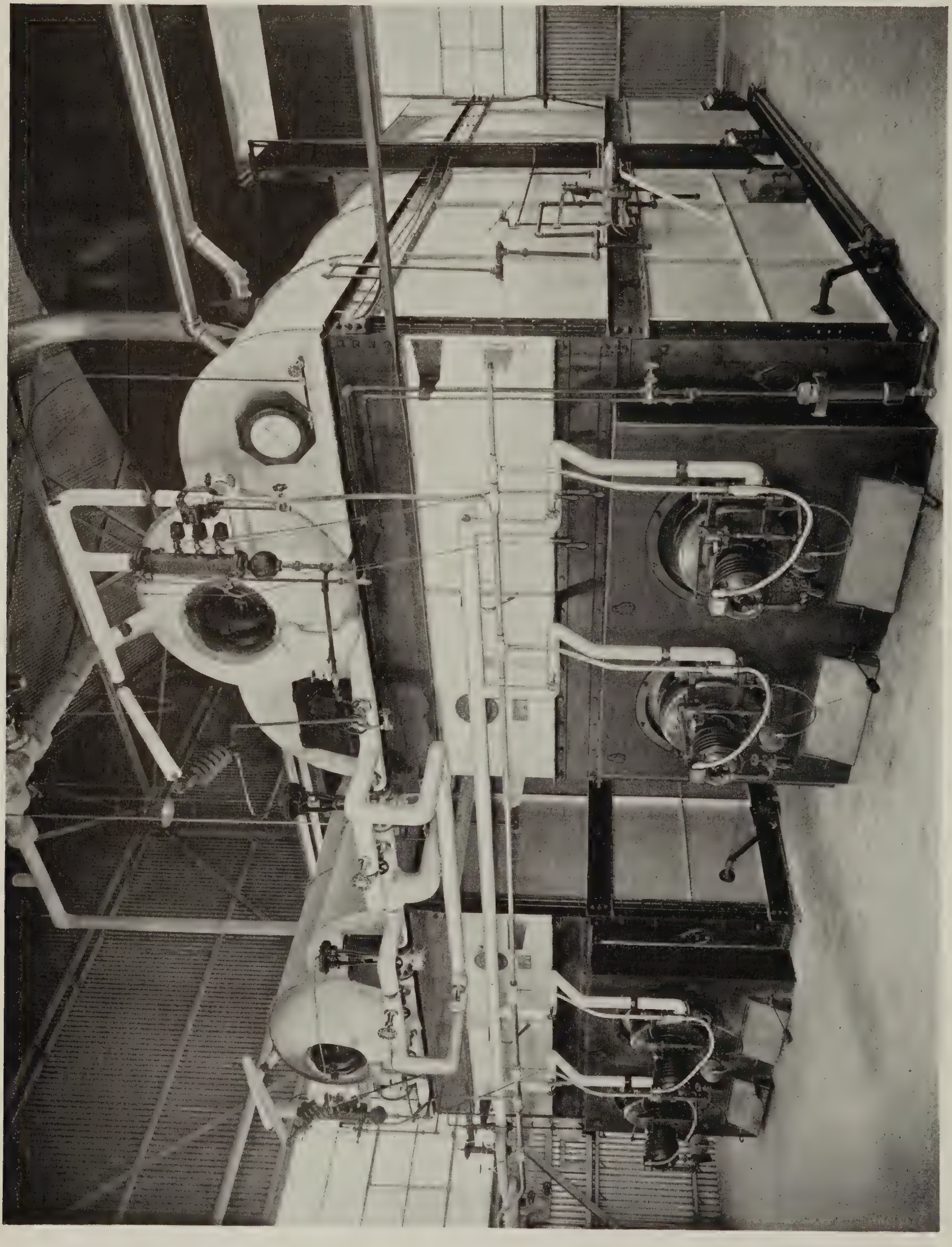
The Following Is a Representative List of Users of Keeler CP Steam Generators

Aluminum Co. of America, Pittsburgh, Penna. (2-250 H. P., 10-300 H. P., 2-400 H. P.)
American Smelting & Refining Co., Hayden, Arizona. (2-800 H. P.)
Anaconda Copper Co., Bonner, Montana (3-500 H. P.)
Revere Copper & Brass Co., Rome, N. Y. (1-250 H. P., 2-150 H. P., 4-500 H. P.)
American Locomotive Works, Auburn, N. Y. (1-250 H. P., 1-500 H. P.)
Great Northern Railroad Co., Allouez, Wis. (2-500 H. P.)
Armstrong Cork Co., Lancaster, Penna. (5-200 H. P., 2-550 H. P., 3-250 H. P., 1-300 H. P., 2-500 H. P.)
Pittsburgh Plate Glass Co., Pittsburgh, Pa. (1-150 H. P., 3-520 H. P., 3-250 H. P.)
Eastman Kodak Co., Rochester, N. Y. (2-350 H. P.)
P. Lorillard Co., Jersey City, N. J. (1-350 H. P.)
A. & M. Karagheusian, Inc., Freehold, N. J. (1-650 H. P., 1-556 H. P.)
Hercules Powder Co., Wilmington, Del. (3-250 H. P.)
Easy Washing Machine Co., Syracuse, N. Y. (1-400 H. P.)
L. C. Smith & Corona Typewriters, Inc. (1-400 H. P.)
The De Vilbiss Co., Toledo, O. (2-245 H. P.)
S. Austin Bicking Paper Co., Downingtown, Pa. (1-225 H. P., 1-600 H. P.)
Libby, McNeil & Libby, Morrison, Ill. (3-265 H. P.)
Carnation Co., Oregon, Ill. (1-400 H. P.)
Pet Milk Company, Neosho, Mo. (1-260 H. P.)
The Borden Co., New York City (1-200 H. P., 2-250 H. P., 1-225 H. P.)
Dairymen's League Co-operative Co., New York, N. Y. (1-80 H. P., 1-150 H. P., 1-82 H. P., 2-50 H. P., 3-225 H. P.)
General Electric Co., York, Pa. (2-200 H. P.)
R. C. A. Manufacturing Co., Indianapolis, Ind. (3-250 H. P.)
Philadelphia Storage Battery Co., Philadelphia, Pa. (1-400 H. P., 1-200 H. P.)
General Motors Corp., Detroit, Mich. (1-125 H. P., 2-500 H. P., 2-150 H. P., 1-300 H. P.)
General Chemical Co., Baltimore, Md. (2-300 H. P.)
Fairchild Aircraft Corp., Hagerstown, Md. (2-225 H. P., 1-450 H. P., 1-500 H. P.)
Republic Aviation Corp., Farmingdale, L. I. (2-650 H. P.)
Republic Steel Corp., Cleveland, O. (2-503 H. P.)
United Aircraft Corp., Chance Vought Div. (4-750 H. P.)
Thompson Aircraft & Products Co., Euclid, O. (3-400 H. P.)
Notre Dame College, Baltimore, Md. (1-375 H. P.)
New York Post Graduate Hospital, New York, N. Y. (2-200 H. P., 1-300 H. P.)
Manila Electric Co., Manila, P. I. (2-750 H. P.)
Peoples Water & Gas Co., Miami Beach, Fla. (2-505 H. P.)
Union of Soviet Socialist Republics, Russia. (24-600 H. P., 80-250 H. P.
United States Naval Base, San Diego, Cal. (7-400 H. P.)
U. S. Government Outlying Naval Bases (18-165 H. P.)
Michigan Tanning & Extract Co., Petosky, Mich. (2-300 H. P.)
Utica Mohawk Cotton Mill, Chadwicks, N. Y. (3-400 H. P.)

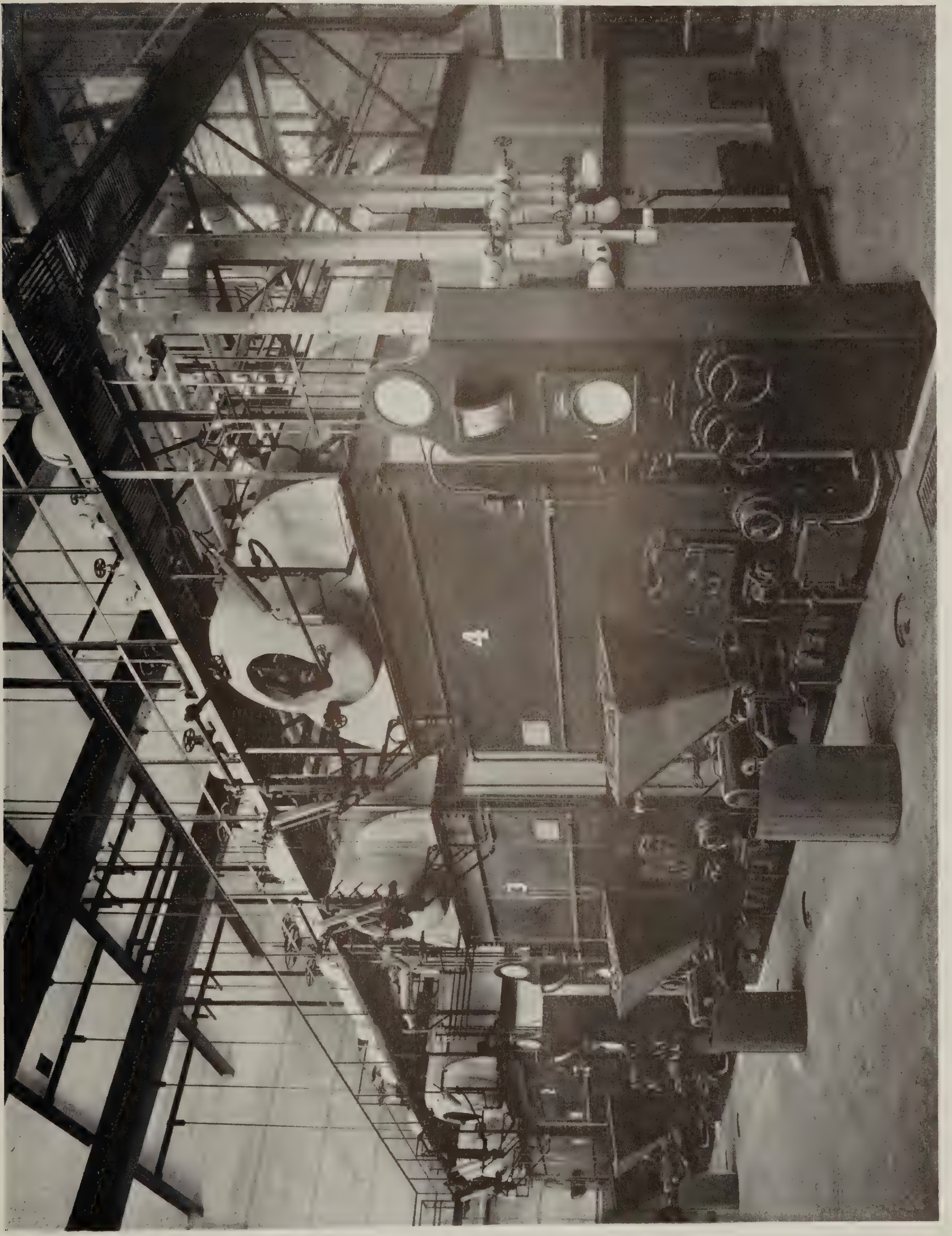
Responsibility

While we specialize in the building of boilers, we contract for complete installation of boilers, grates, stokers, oil burners, pulverized fuel burning equipment, superheater, soot blowers, stacks and breechings.

Under our plan the best equipment the industry has to offer may be selected. You are not confined to the choice of one particular make, yet undivided responsibility can be obtained by placing your complete contract with the E. Keeler Company.



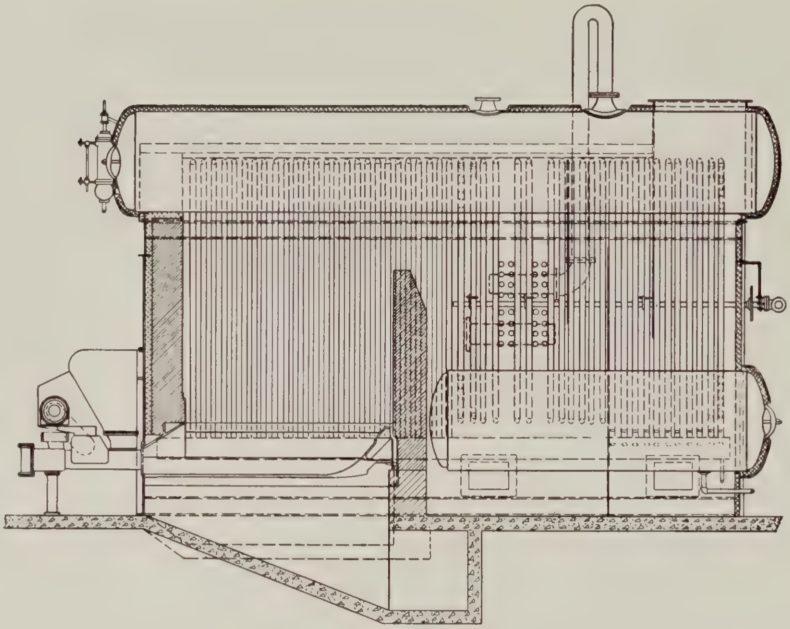
Serving An Important War Industry



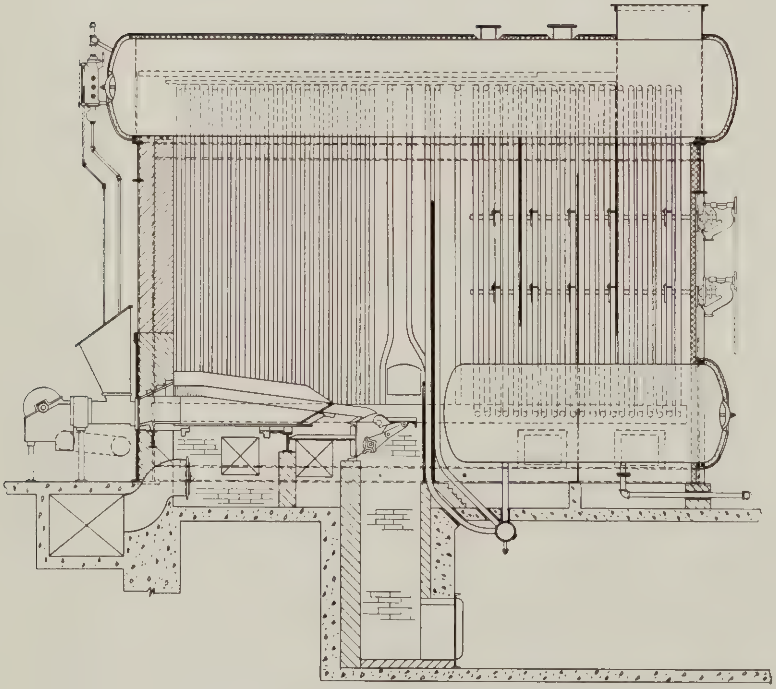
A Well Engineered Installation

The picture at the right shows a longitudinal section of a medium sized CP boiler equipped with a single retort side dump underfeed stoker and a Keeler convection type bare tube drainable superheater. Units of this type are in use delivering up to 50,000 lbs. of steam per hour.

One customer who operates two of these units of moderate size reports a fuel saving of approximately seven hundred dollars per month, a reduction of 25% over the cost of operating the boilers these steam generators replaced.



Type CP Boiler, Super Heater and Underfeed Stoker



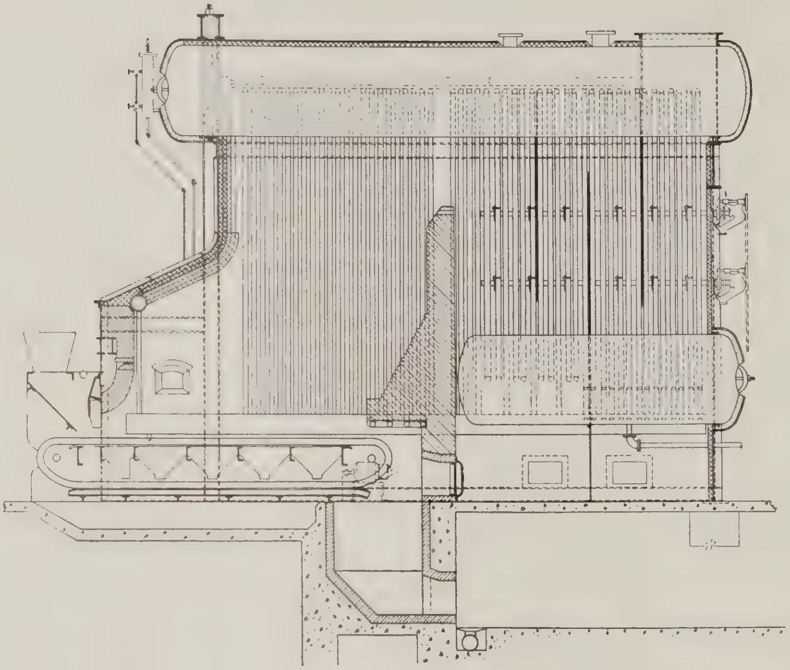
Type CP Boiler With Stoker and Water Cooled Bridge Wall

The picture at the left shows a longitudinal section of a CP boiler equipped with a multiple retort rear dump underfeed stoker. This boiler has a water cooled bridge wall with Keeler cast iron water wall armor applied to protect the tubes from the abrasive action of the ash and clinkers. The furnace of this boiler is water cooled on three sides and the top, the front wall only being built of refractory material.

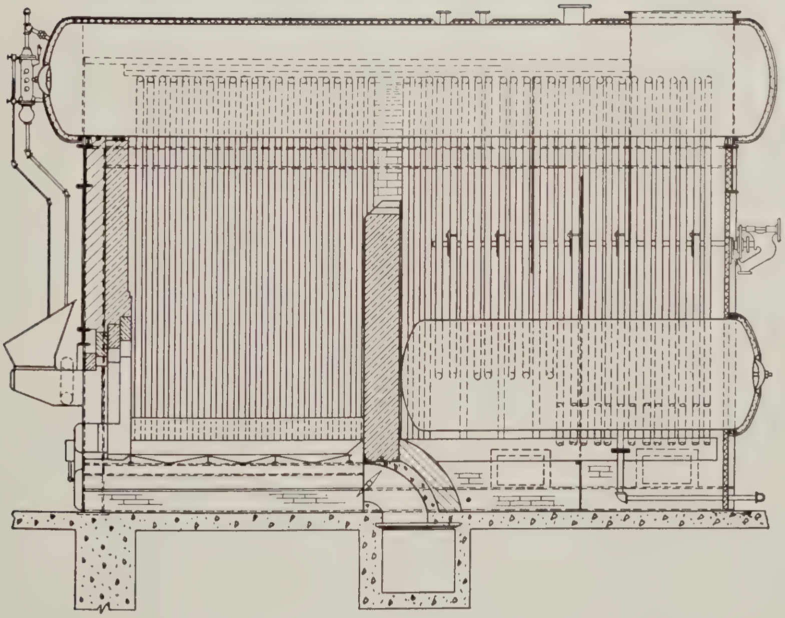
Another customer writes: "We have had two of these generators in service in our plant for the past several years and during this time have experienced nothing but the best performance. They are well constructed and the maintenance has been practically nothing."

The illustration at right shows a Keeler Type CP Steam Generator equipped with a chain grate stoker for burning bituminous coal. The Steam Generator illustrated is provided with water cooled front arch and equipped with two built-in soot blowing elements.

Chain grate stokers for burning anthracite coal, or traveling grate stokers can be installed with slight modification of the furnace design.



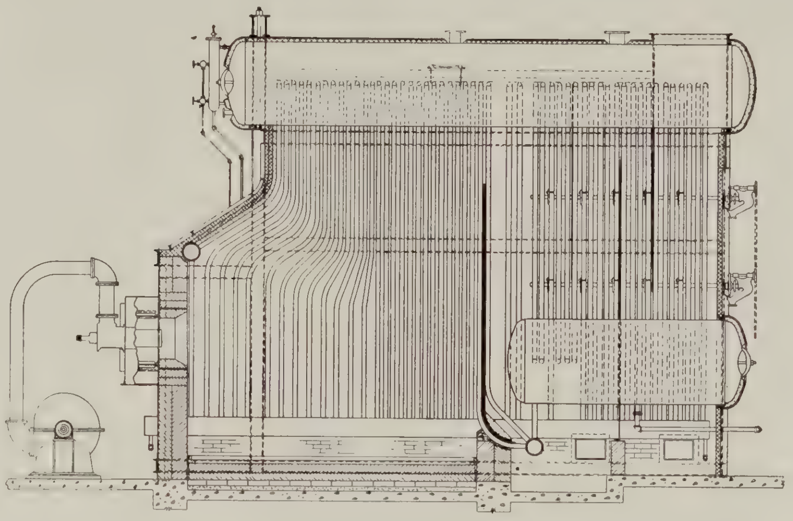
Type CP Boiler and Traveling Grate Stoker



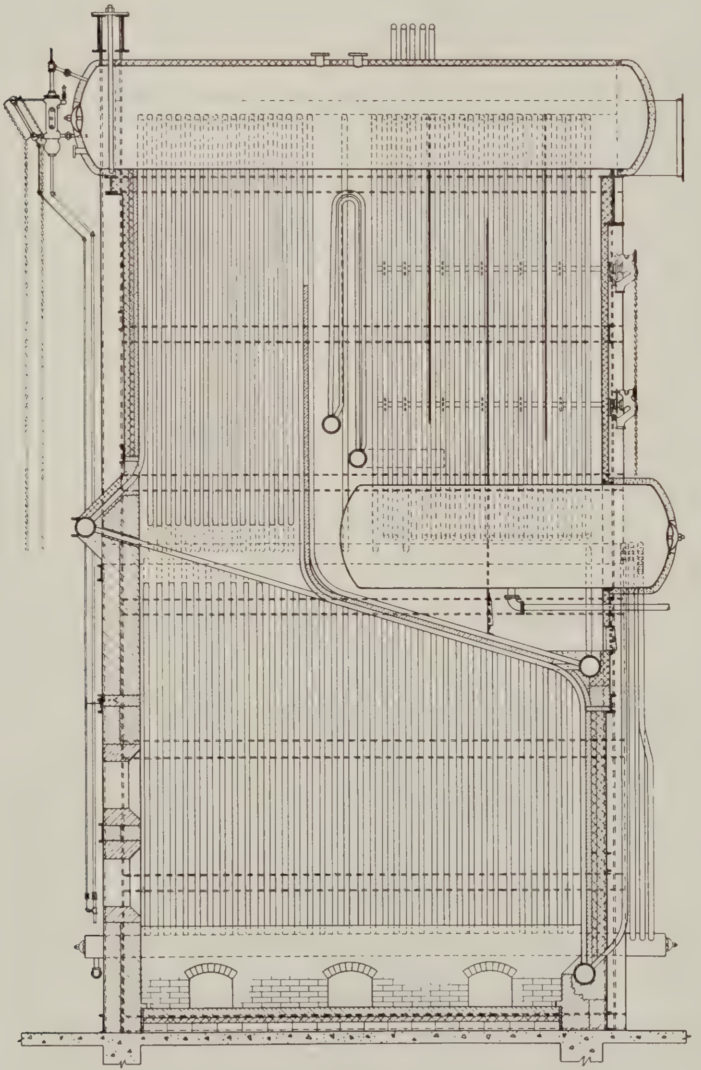
Type CP Boiler and Spreader Stoker

The line drawing at left is of a 300 H. P. Type CP Steam Generator, two of which are installed in a Michigan Tannery. They are fired with spreader type stokers. As a large percentage of the fuel is burned in suspension with this type of stoker it is essential to have a large furnace volume and low furnace temperature to prevent fusing of the flyash on the boiler heating surface. The Keeler Type CP Steam Generator meets these requirements without excessive overall height.

The picture at the right shows a longitudinal section through a CP boiler equipped for burning powdered coal. In addition to the usual water cooled side walls, it has a water cooled bridge wall and a water cooled front arch, exposing the greatest possible amount of heating surface to radiant heat. To burn pulverized coal successfully requires a large furnace. Greater furnace volume with less head room can be obtained with a CP boiler than with any other type of water tube boiler.



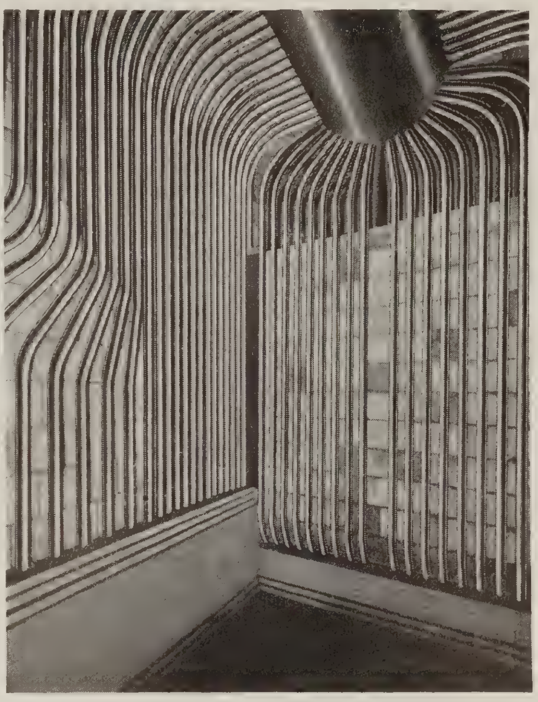
Low Setting for Powdered Fuel



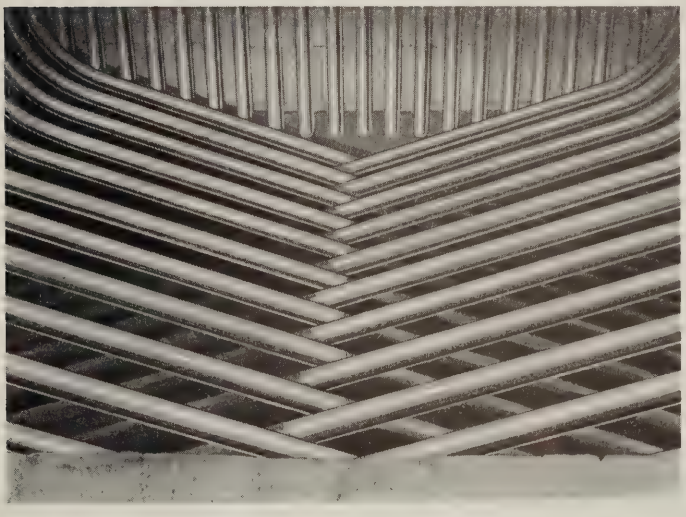
High Setting for Powdered Fuel

The picture at the left shows a longitudinal section through a CP boiler also equipped for burning pulverized coal. This design is patented in the United States (Patent No. 2306097) and in Canada (Patent No. 418720). While it requires more head room than the design shown above it requires less length, the furnace being located entirely under the boiler. The furnace of this boiler is water cooled on all four sides. The roof tubes act as a slag screen between the lower and upper combustion chamber. Ample space is provided for a Keeler convection type superheater. On account of the large amount of water wall surface and long gas travel this unit can be operated at very high ratings without the use of an economizer or an air preheater. Fly ash, which is so troublesome when burning pulverized coal in other types of boilers, due to fusing on the heating surface, is kept below the fusing point in the CP boiler because of the large amount of water cooled surface which surrounds the furnace.

The picture at the right is a view of the interior of the furnace of the CP pulverized coal fired boiler shown at the top of Page 18. It shows the left hand side wall and the water cooled bridge wall at the rear of the furnace. Of this installation the Consulting Engineers have the following to say: "The owner is quite pleased with the equipment, and we can truthfully say that we have never seen a better set up for a plant of this size. You are to be heartily congratulated upon the quality of materials and workmanship which made this installation possible."



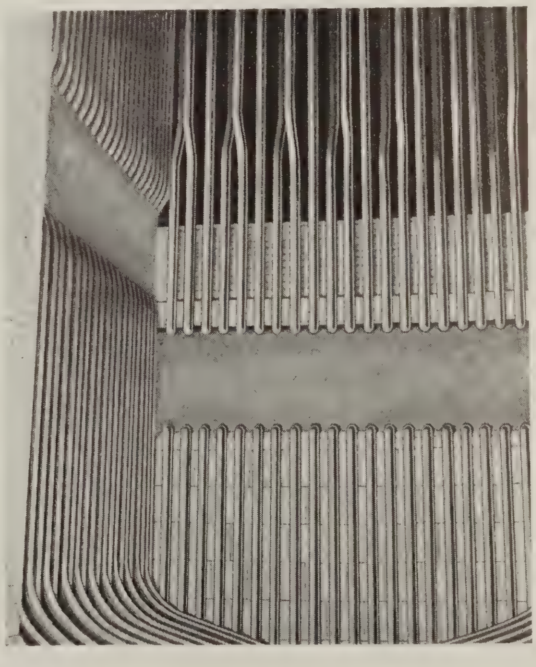
Water Cooled Furnace for Burning Powdered Coal



Water Cooled Furnace Floor for Powdered Fuel Furnace

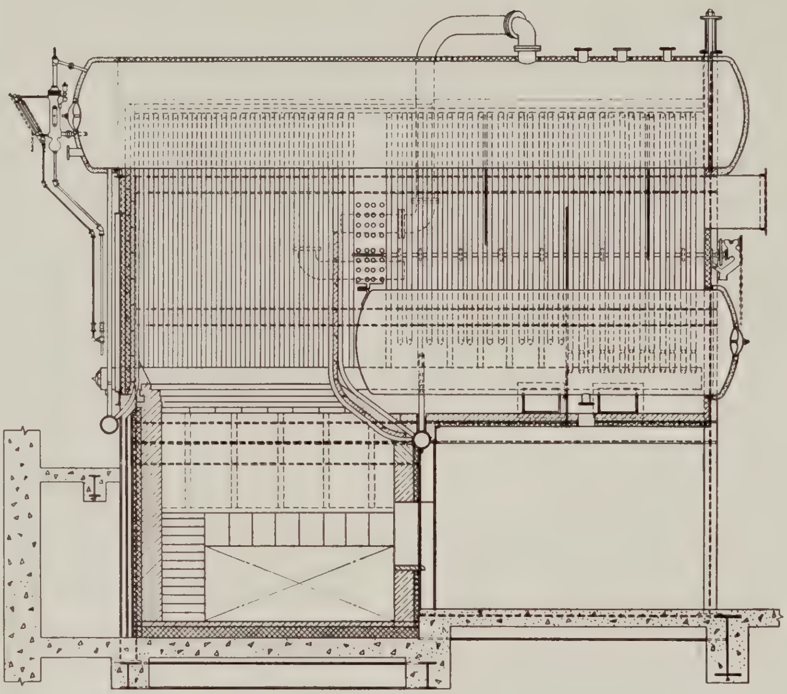
The view at the left shows a water cooled furnace floor for use with low fusing ash under a pulverized coal fired boiler. Every other tube of each furnace side wall criss-crosses at the center of the furnace and terminates in the header at the opposite side of the furnace. Water cooled bridge wall tubes are shown at the rear of the furnace.

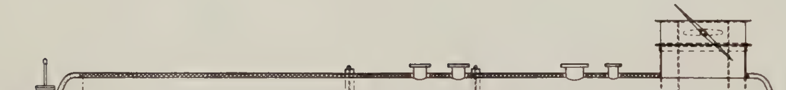
The view at the right shows the interior of the furnace of a large CP steam generator, two of which were installed for a Western Smelting Company, to be operated with waste heat. The lower side water wall and a part of the upper side water wall appear at the left of the picture. The water cooled bridge wall, which is also in two sections, appears at the rear of the furnace. A portion of the water cooled furnace floor is also shown. It is reported that the saving on lancing alone over older boilers in this same plant is approximately forty-two dollars per twenty-four hour day.



Water Cooled Furnace for Large Waste Heat Boiler

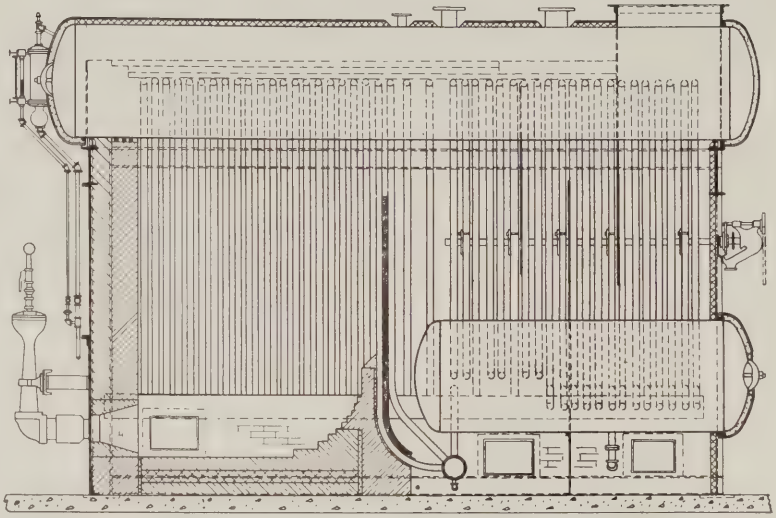
The picture at the right shows a longitudinal section of a CP boiler with a furnace designed to utilize the waste heat from a municipal incinerator. The rectangular opening shown in the side wall of the furnace near the floor is where the gases from the incinerator enter. The rear wall of the furnace is designed to receive an oil burner to supplement the waste heat when more steam is required. The upper furnace of this boiler is completely water cooled. A Keeler convection type superheater is installed behind the water cooled bridge wall.

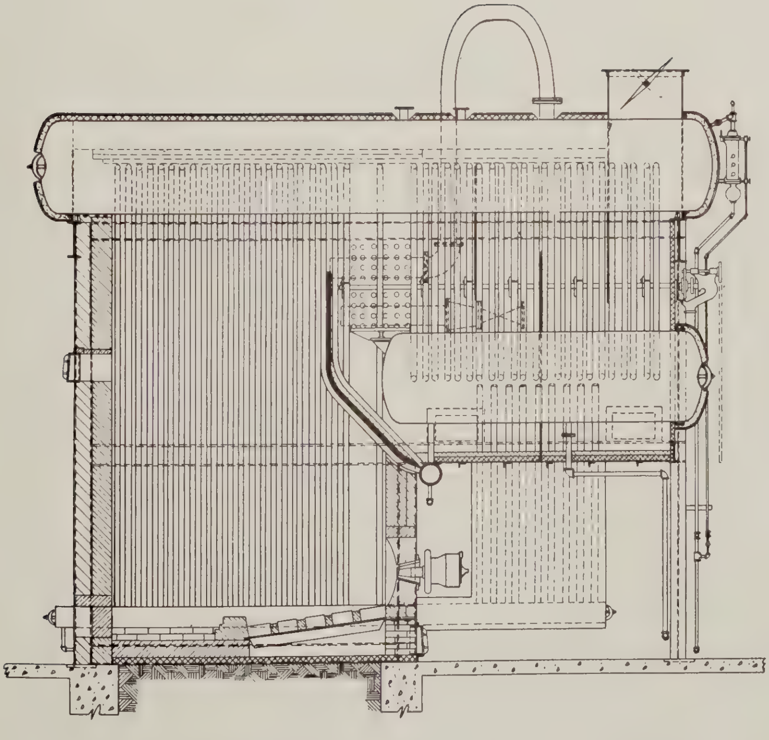




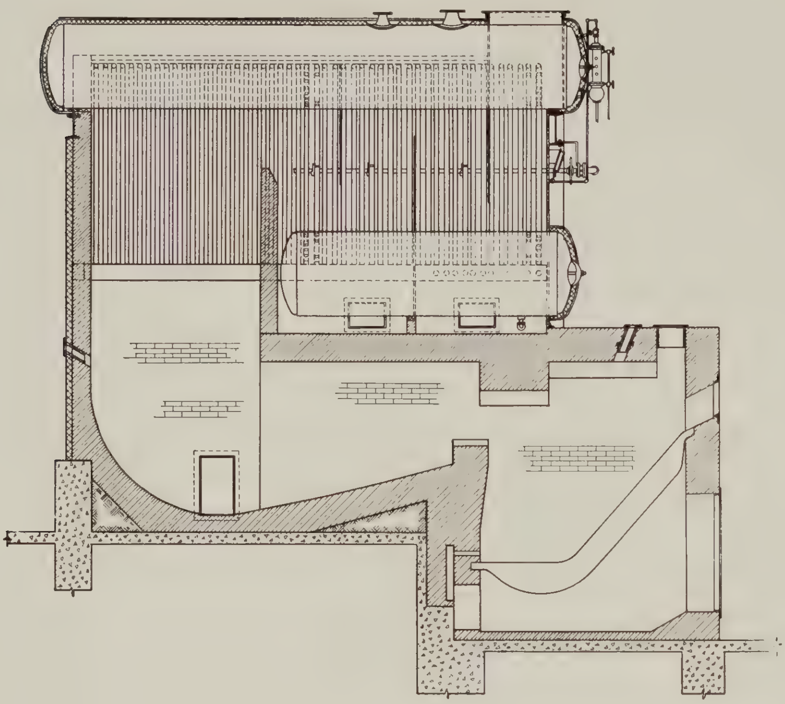
The picture at the left shows a longitudinal section of a CP boiler with a wide space at the rear of the bridge wall, at the top of which an opening is provided in the side wall casing to receive a connection leading to an electrometalurgical furnace, the waste heat from which is utilized to supplement that supplied by coal burned on a spreader type stoker in the boiler furnace. Three of these units are installed in a West Coast Electrometalurgical Works.

The picture at the right shows a longitudinal section of a CP boiler designed for burning natural gas. A water cooled bridge wall is used in this installation. The same type of setting is used for oil firing. Twenty-nine different makes of oil burning equipment are being used successfully under CP boilers. On account of the water cooled furnace walls a high percentage of CO_2 can be maintained without danger to the setting. Ample combustion chamber volume can be obtained without excessive height. Back shot burners can be used if desired.





The picture at the left shows a longtitudinal section of a CP boiler especially designed to suit a boiler room where space conditions did not provide for a firing aisle. The boiler was raised on its structural frame to provide a firing aisle under the lower drum and the burner was installed in the rear wall of the furnace. Since the first two of these units were put in service an additional larger unit of the same type has been added. A Keeler bare tube convection type superheater is installed in each of these boilers. For the convenience of the firemen the water column and steam gauge are installed at the firing end of the boiler.



Bagasse Furnace

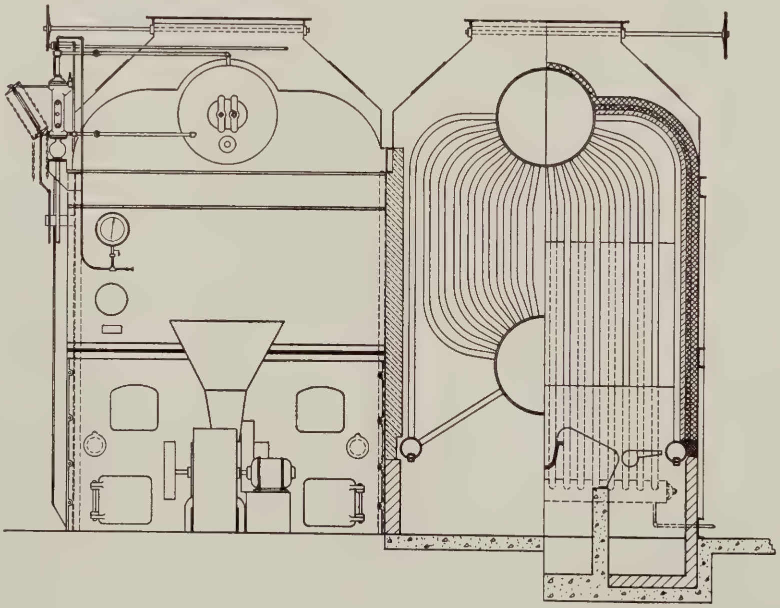
The picture at the left shows a Keeler Type CP Steam Generator with furnace for burning Bagasse, or hogged fuel. No change is necessary in the standard construction of the generator, even when special furnace designs are required.

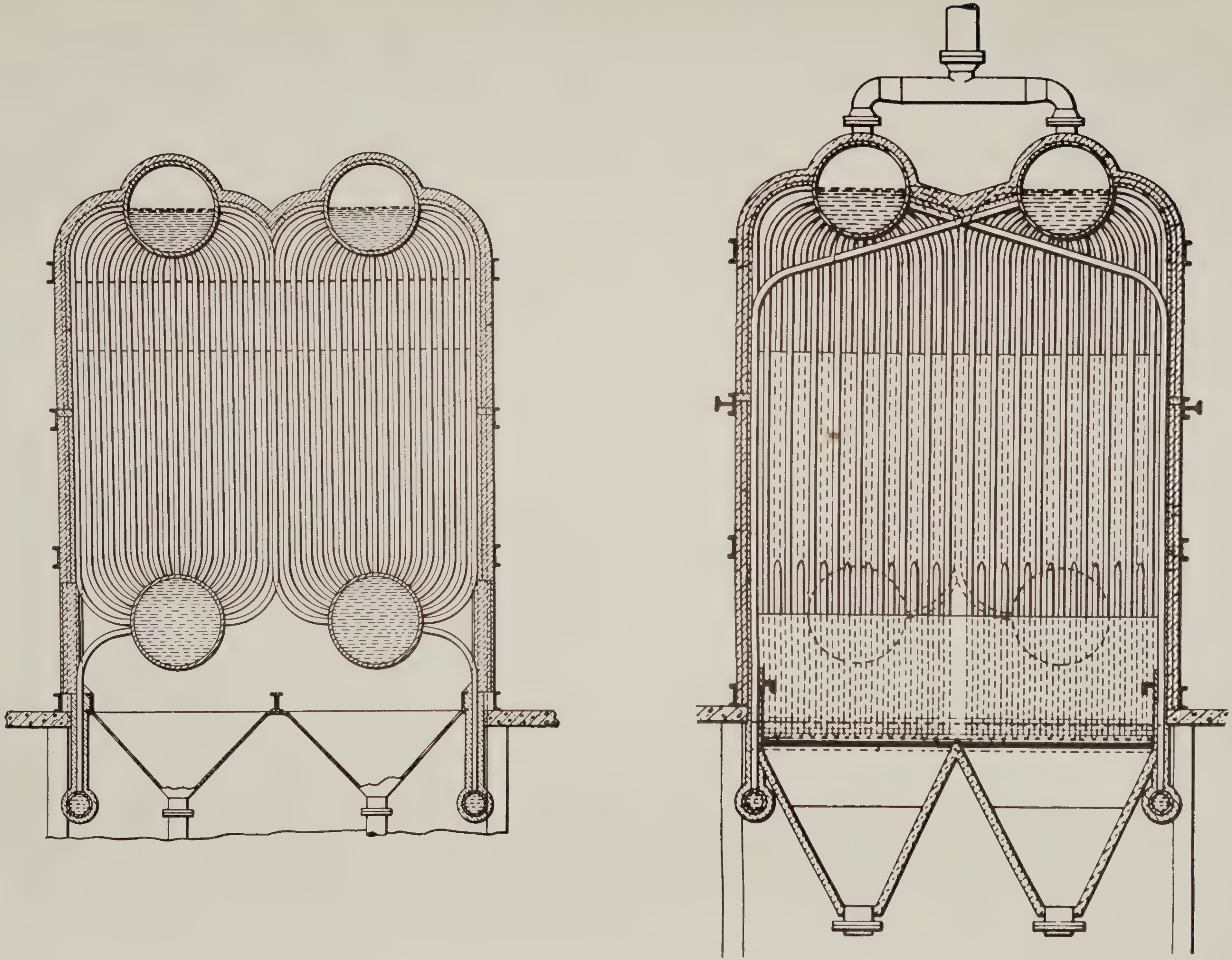
The Keeler Type CP Steam Generator is adaptable for use with any kind or quality of fuel.

Brown Patented Furnace

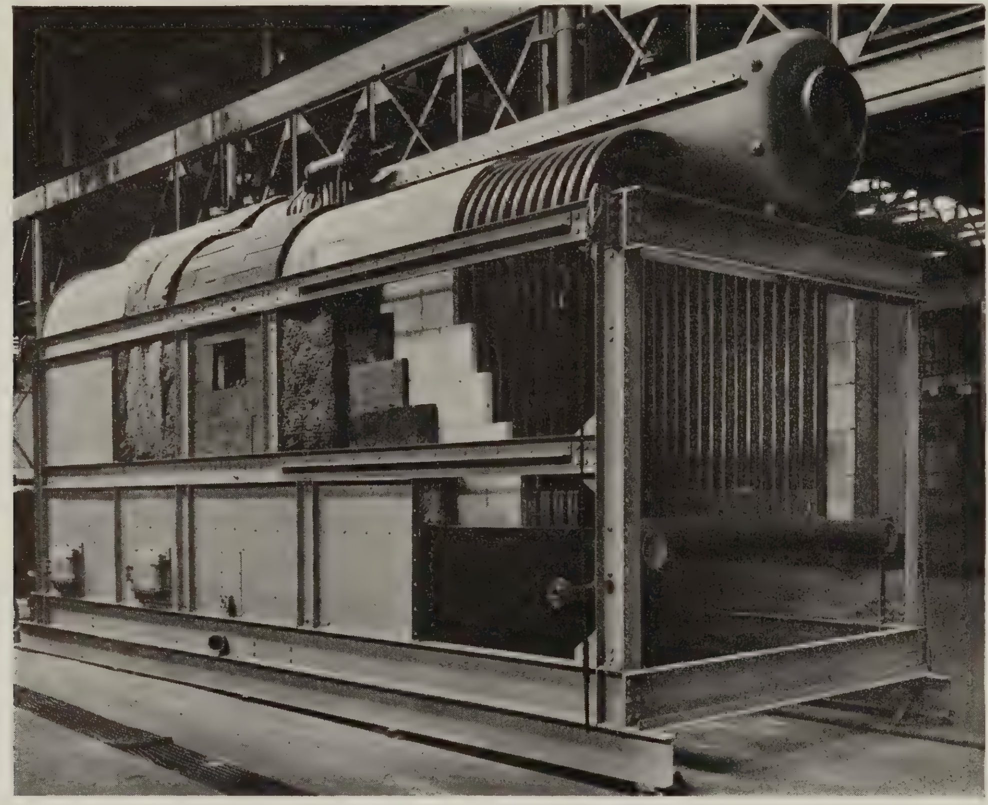
The furnace shown above is what is known as the Brown furnace for burning Bagasse or saw mill waste. It has been used with remarkable results under many Keeler boilers in the sugar mills in the Philippine Islands and China. The E. Keeler Company is licensed to use this patented furnace under Keeler boilers. U. S. Patent No. 1,991,375.

The picture at the right shows two CP boilers set in a battery setting. In this type of setting a fire brick wall is installed between the two boilers in lieu of casings, but both sides of each furnace have water wall tubes, the same as when each boiler is set singly. With this type of setting one stack with a twin bottom can be set on a steel frame, built integrally with the boiler frame, directly over boiler gas outlet.

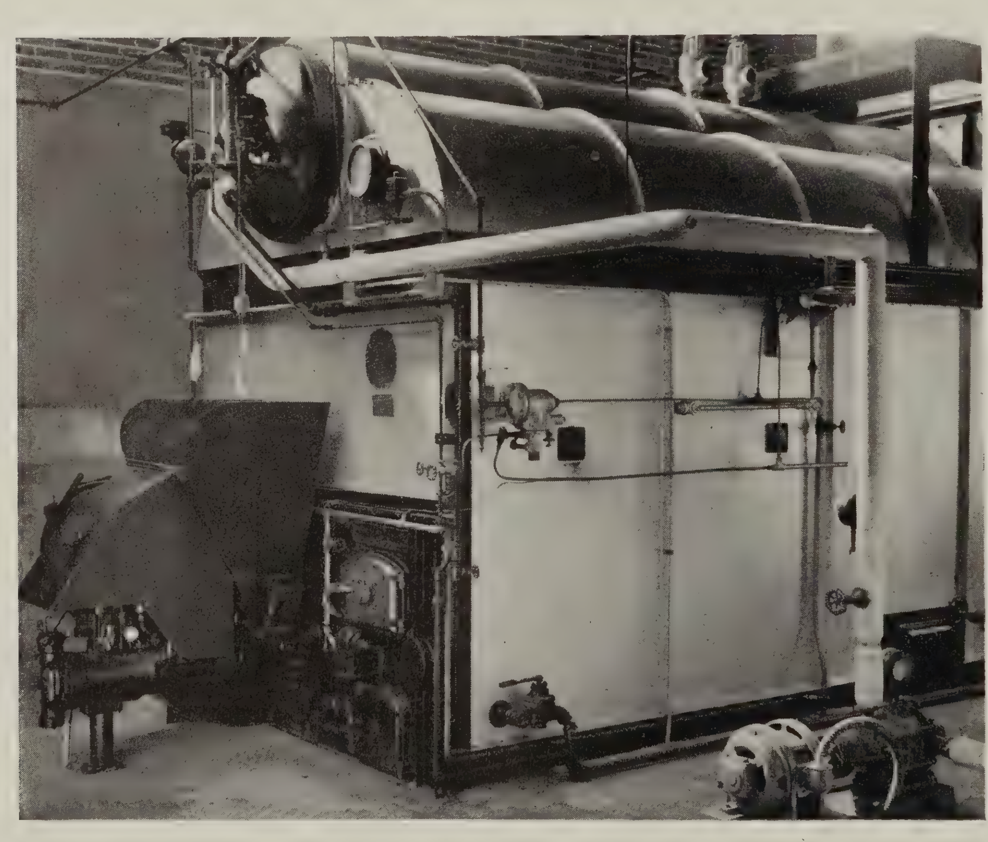




The views shown on this page illustrate the construction of the CP Duplex Unit consisting of two pressure units served by the same furnace and inter-connected in such a way as to have a uniform water level. The view at the left is taken back of the bridge wall, while that at the right is a section through the furnace.



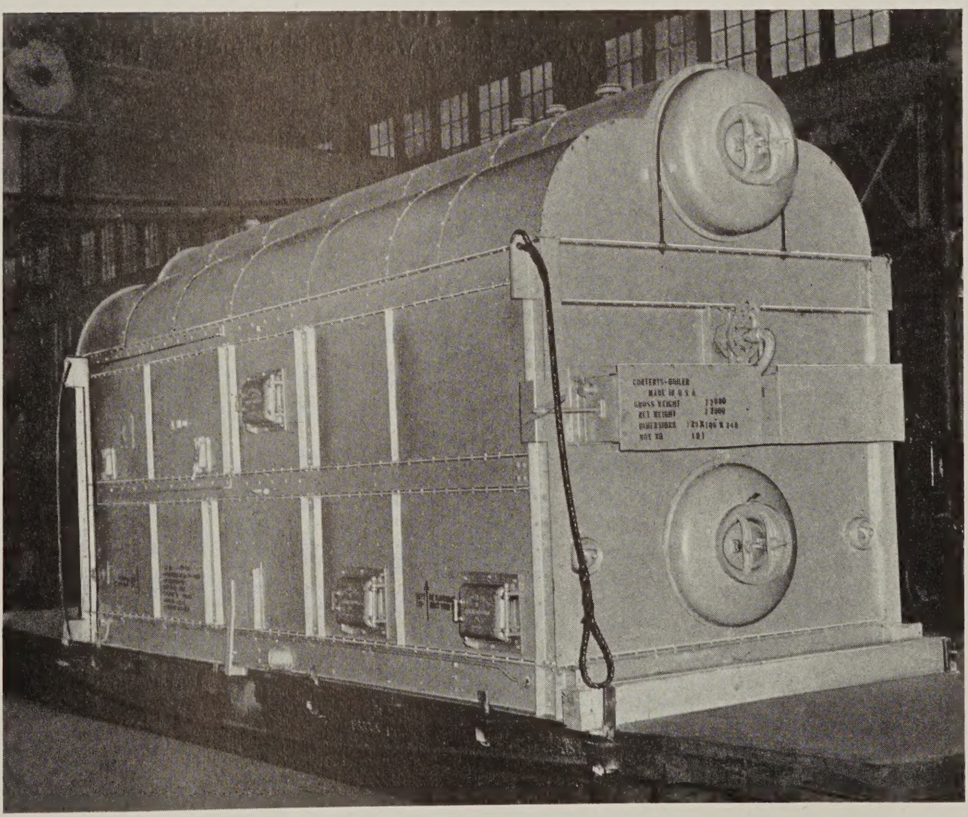
Showing Tile, Insulation and Casing

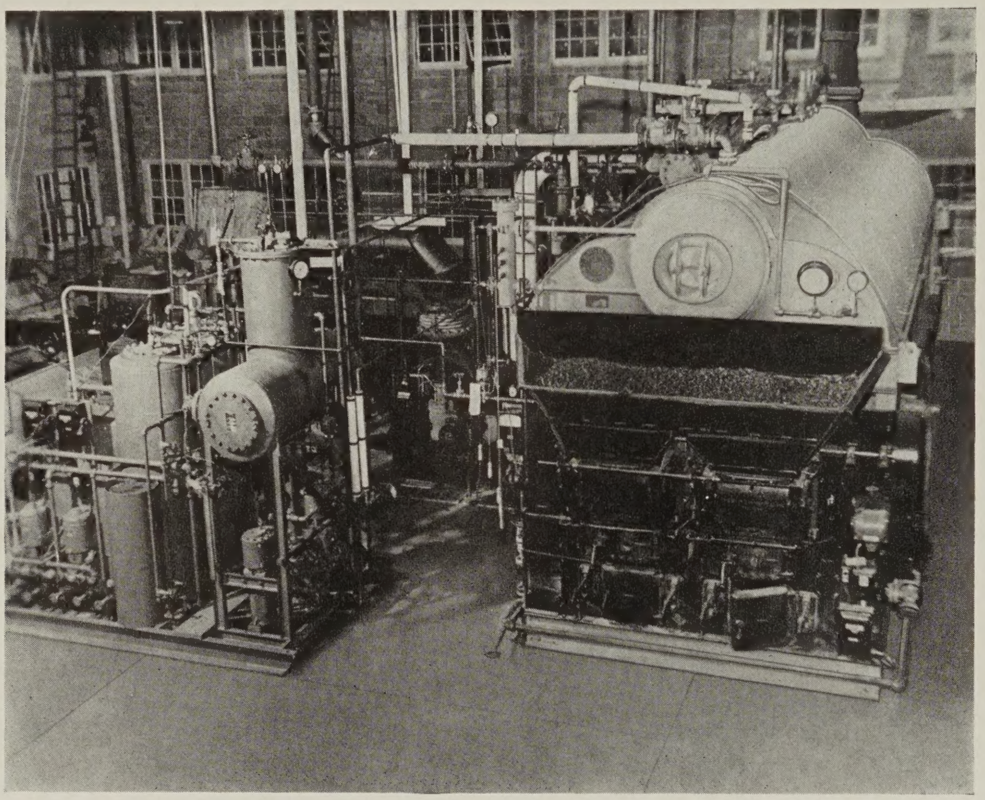


Showing CP Boiler and Underfeed Stoker

PACKAGED POWER

To alleviate distress in the devastated areas of Russia after the German retreat it was necessary to provide a number of small, compact and inexpensive power plants that could be put into service in the shortest possible time. The equipment for eighty such plants, each having a capacity of 500 K. W., was shipped to Russia during the spring and summer months of the year 1944. Each plant consisted of a 250 Horsepower Keeler type CP boiler designed for 350 lbs. per sq. in. pressure, with a Keeler superheater designed to deliver steam at a temperature of 700° F. at the superheater, outlet, a steam turbine driven generator, condenser, feed water heater, feed water conditioning equipment and an induced draft fan and stack. The boilers were completely assembled at the factory with superheater and soot blowing equipment in place as shown in the picture at the bottom of this page. On a following page will be found pictures showing the complete installation as assembled and tested by the E. Keeler Co.





Views shown on this page are of one of 80-500 K. W. packaged power plants, shipped to Russia. Eighty Keeler type CP boilers were furnished for these plants. The boiler appears at the right in each view.

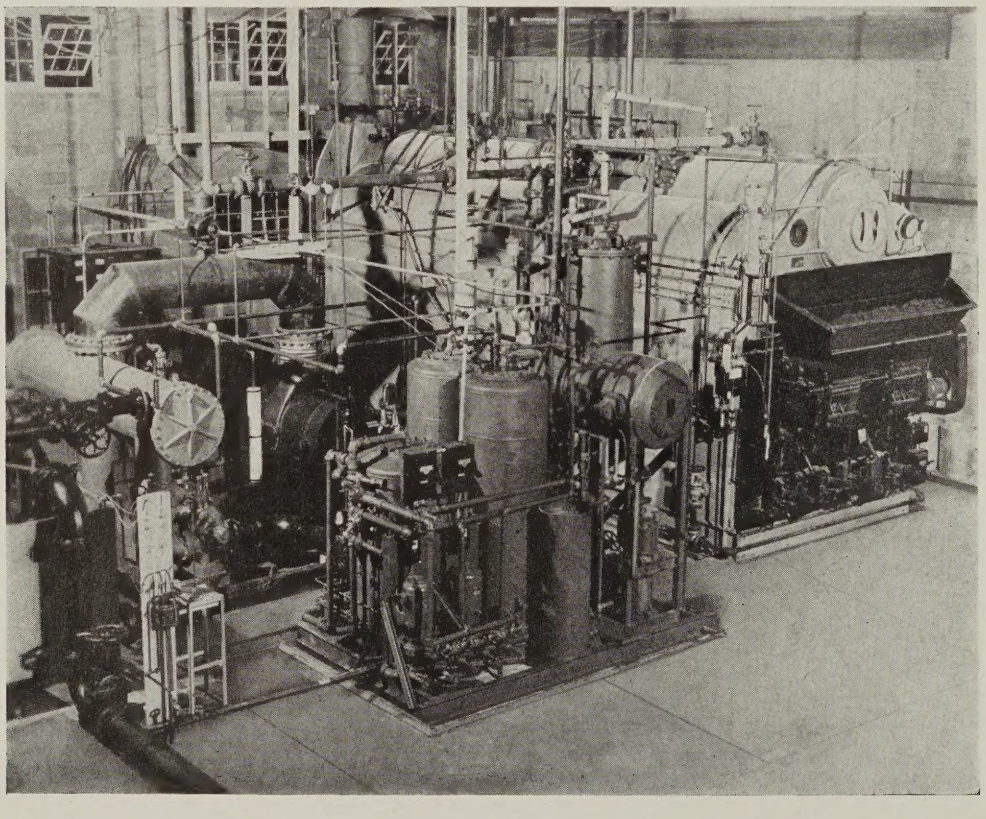
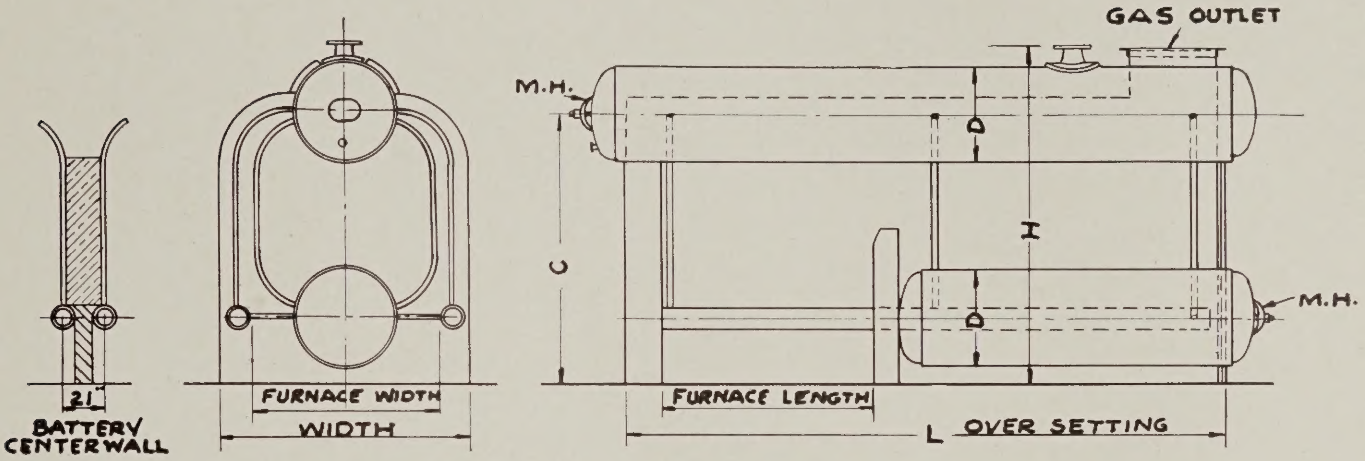


Diagram and Principal Dimension Table



Horse Power	SETTING DIMENSIONS					STANDARD SETTING SIZE FURNACE			Drum Diameter
	Width Single	Width Battery	Length L	Height H	Height C	Width	Length	Cu. Ft. Vol.	
50	6'-8⅞"	13'-9½"	12'- 9⅛"	9'- 8¾"	7'-10"	4'-6"	4'-0"	110	32"
60	7'-2⅞"	14'-9½"	12'- 9⅛"	9'- 8¾"	7'-10"	5'-0"	4'-0"	124	32"
75	7'-2⅞"	14'-9½"	14'- 5¼"	9'-11¾"	8'- 1"	5'-0"	4'-6"	142	32"
80	7'-2⅞"	14'-9½"	15'- 3⅜"	9'-11¾"	8'- 1"	5'-0"	5'-0"	157	32"
100	7'-8⅞"	15'-9½"	16'- 4⅜"	10'- 6¾"	8'- 8"	5'-6"	5'-6"	220	32"
125	8'-2⅞"	16'-9½"	16'-11"	10'- 9¾"	8'- 9"	6'-0"	6'-0"	267	36"
150	8'-8⅞"	17'-9½"	17'- 3"	10'-11¾"	8'-10"	6'-6"	6'-0"	290	36"
175	8'-8⅞"	17'-9½"	18'- 7"	11'- 4¾"	9'- 3"	6'-6"	6'-6"	330	36"
200	8'-8⅞"	17'-9½"	19'- 6"	11'-11¾"	9'-10"	6'-6"	7'-0"	372	36"
225	9'-2⅞"	18'-9½"	20'- 2"	11'-10¾"	9'- 8"	7'-0"	6'-6"	352	38"
250	9'-2⅞"	18'-9½"	21'- 5"	12'- 1¾"	9'-11"	7'-0"	7'-0"	400	38"
250	10'-2⅞"	20'-9½"	19'- 5½"	13'- 0¾"	10'- 8"	8'-0"	6'-6"	479	42"
275	10'-2⅞"	20'-9½"	19'-11½"	13'- 8¾"	11'- 4"	8'-0"	7'-0"	525	42"
300	10'-2⅞"	20'-9½"	20'-10½"	14'- 1¾"	11'- 9"	8'-0"	7'-6"	613	42"
350	11'-2⅞"	22'-9½"	21'- 5"	15'- 7"	10'-10"	9'-0"	8'-0"	830	42"
400	12'-5"	25'-1¾"	21'- 7"	16'- 6¾"	13'-11"	10'-0"	8'-0"	993	48"
450	12'-5"	25'-1¾"	22'- 7"	17'- 3¾"	14'- 8"	10'-0"	8'-6"	1132	48"
500	12'-5"	25'-1¾"	23'- 4"	18'- 1¾"	15'- 6"	10'-0"	9'-0"	1241	48"

NOTE: For certain types of combustion equipment dimensions C and H may have to be increased, depending on ratings expected.

Foundations

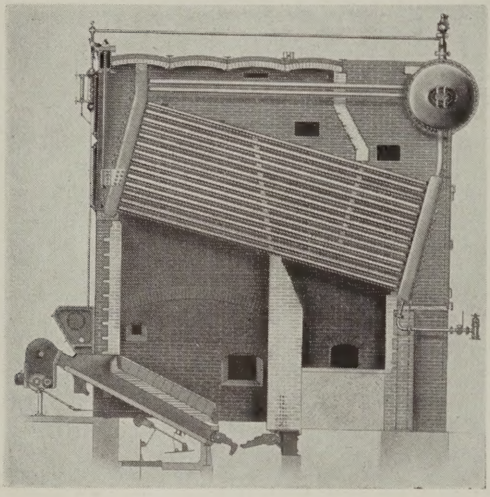
The foundations are simplified, as concrete piers are necessary only under the four corner supporting members. A thin concrete mat or floor suffices for balance of area covered by the boiler.

NOTE: For dimensions of boilers larger than 500 H. P. write to E. Keeler Company, Williamsport, Pa.
Units as large as 1,500 H. P. are available

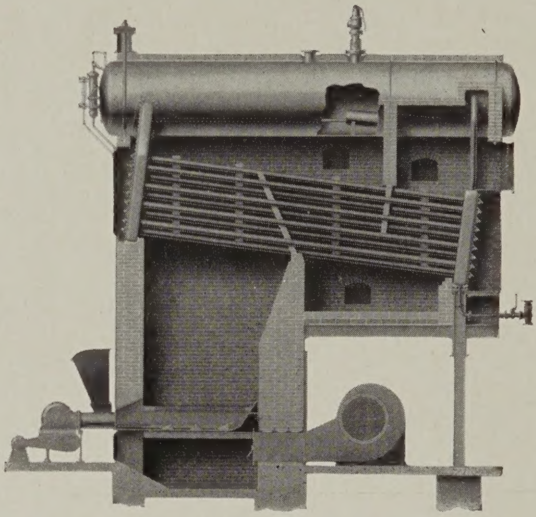
Other types of boilers manufactured by E. Keeler Co. are illustrated on the back cover of this bulletin.

Other Types of Boilers Made by E. Keeler Co.

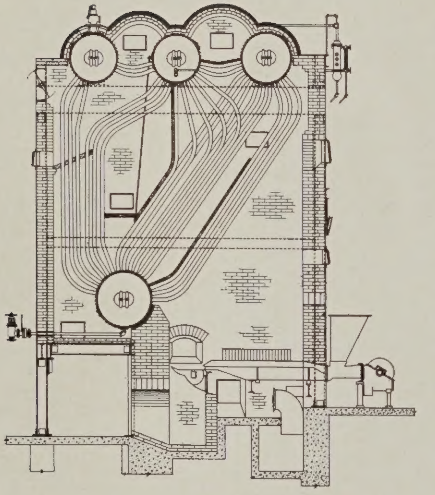
BULLETINS SENT ON REQUEST



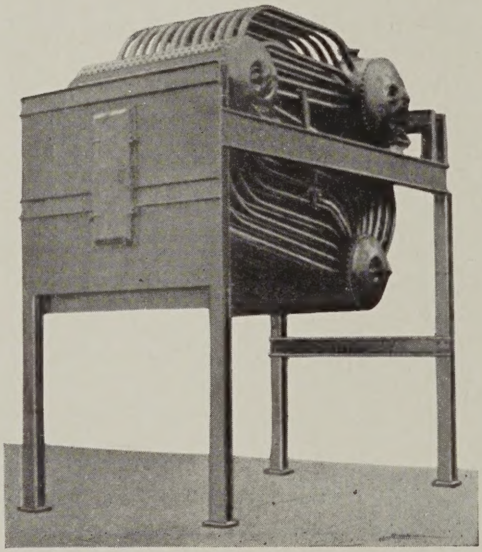
Cross Drum Water Tube Boiler



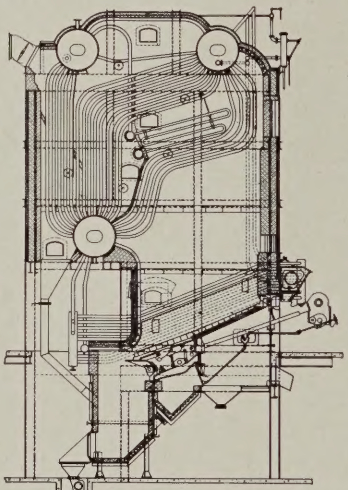
Longitudinal Drum Water Tube Boiler



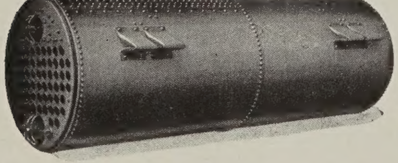
Type DC Water Tube Boiler



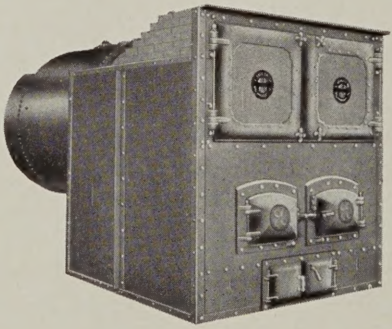
Type J Water Tube Boiler



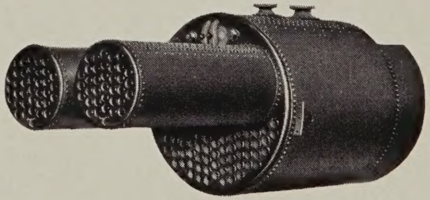
Type MP Water Tube Boiler



Return Tubular—
Lug Set or Steel Suspended



Double Duty Boiler



Double Duty Boiler
Ready for Furnace Casing

We Make Complete Installations of Boilers, Brickwork, Stacks, Stokers, Soot Blowers, Etc.